

## DATA ACQUISITION USING ANDROID AND PIC MICRO-CONTROLLER

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### ABSTRACT

Today for real time applications it is important to monitor system in efficient way which puts limits in terms of accuracy and repeatability if a human is employed on plant to do this task the traditional automated monitoring (surveillance) systems are wired and larger in size it mostly use only pc as a surveillance terminal, which works efficiently but does not give portability. The proposed system describes an intelligent monitoring system which is based on android platform gives facility to access monitored parameters quickly on mobile handsets anywhere from the world. As the mobility provided by the mobile phones and the application support given by the Android system over 2G and 3G network that are infinite possibilities to expand monitoring system.

**KEYWORDS:** Remove Monitoring System with Android, Data Acquisition with Android, Surveillance System Using PIC Microcontroller and Android

### INTRODUCTION

There is a mature market for such kind of surveillance system and its cost is relatively high. However, it can't meet the surveillance needs for moveable of place which has not strict needs on performance and reliability. In fact such kind of needs is becoming more and more intense to some instant. With the development of 3G technology. Wireless bandwidth is larger, which makes it possible to develop more content rich applications for mobile phone, such as video, audio and digital data and provides a basement for the realization of wireless smart surveillance system at the same time. Android is an open source phone operation system based on Linux platform and it's the first truly open and complete mobile software for mobile terminal. In order to solve the shortcoming of traditional a surveillance system, this project proposed a surveillance scheme based on android smart phone, which makes it possible to monitor target site in anywhere and anytime via android smart phone under the coverage of wireless network. This project proposed a monitoring scheme prototype based on android smart phone terminal. By collecting and processing data at server, sending data to smart phone terminal via web services, it reached the purpose of monitoring the target site anywhere and anytime under the coverage of wireless network and enhances the flexibility of surveillance system greatly.



**Figure 1: Introduction**

## PROPOSED SYSTEM

This complete system is dividing into four distinct parts:

- Sensor Expansion Board.
- PIC18F4550 Mother Board.
- A dedicated PC working as Database server.
- Android compatible Mobile loaded with Application that supervises the system's parameters.

For this system the input is take form the sensors. These sensors will provide the analog as well as digital data. In this system PIC 18F4550 is used which support both input data. Monitoring is done on mobile or desktop. A per the application or environment the sensors can add or removed.

## HARDWARE DESIGN SYSTEM

Hardware design of the system is divided into following parts:

- Sensor Expansion board
- PIC18f4550 motherboard
- **Sensor Expansion Board**

Even though sensor coverts physical parameters such as pressure, temperature, humidity, smoke etc, into their equivalent electrical parameters these are sometime not in compatible with PIC. Hence sensors input are fed to PIC microcontroller via expensing board.

- **PIC 18f4550 Motherboard**

Pic18f4550 is microchip's microcontroller having inbuilt ADC which has very high resolution of 10-bit which maintains accuracy capable of handling 13 channels which gives flexibility to user to expand his system to make it powerful.

## SOFTWARE DESIGN SYSTEM

Software required for proposed systems are:

- MPLAB IDE by microchip
- Application of java & Xml using eclipse environment.
- My SQL database server
- Android development tool by Google.

## MPLAB IDE

It is integrated development Environment a product of microchip which gives a facility of editor, compiler, debugger, programmer in order to program pic micro controllers using either assembly language or high level language such as embedded c. the code written in embedded c enables microcontroller to sense many analog channels continuously

with specific interval as programmed, after accepting these analog data it converts into 10-bit digital value. Using UART module this digital data is sent to a computer which acts a dedicated server accepts data from microcontroller via RS-232 port.

## APPLICATION OF XML AND JAVA

Java code needs to be written to accept data coming into RS-232 port in ASCII form using packages importing as follow

```
import gnu.io.CommPortIdentifier;

import gnu.io.PortInUseException;

import gnu.io.SerialPort;

import gnu.io.SerialPortEvent;

import gnu.io.SerialPortEventListener;
```

This packages imported provides necessary methods to access serial port which belongs to LINUX. Once data is accessed it is simultaneously stored into MY-Sql by importing following packages

```
import java.sql.Connection;

import java.sql.PreparedStatement;

import java.sql.ResultSet;

import java.sql.Exception;

import java.util.ArrayList;
```

Now this data which stored into MY-SQL in the form of table is converted into web services using XML. XML stands for extensible markup language which is designed to store and transport data. It simplifies data availability of data whenever required. Once web servers are made its possible to access it using android tool.

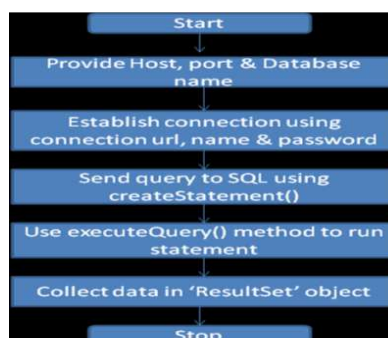


Figure 2: Procedure to Establish Connection with My SQL

## ANDROID DEVELOPMENT TOOL BY GOOGLE

- GUI Design

For Android, there are two methods to design interface layout one is via java, the other is via xml file. Though the speed of parsing an xml file is slower than java file, it's not good for maintenance of later works if mixed the interface

layout code together with the corresponding Activity logic code. From the view of software design the second method meets the basic requirement of low coupling and high cohesion. Therefore, this system uses xml file to implement interface layout. In xml file, it can meet the needs of system. GU design by using <Absolute Layout>,<Button/>,<Text View/>,<image View/>



**Figure 3: Graphical User Interface**

- **Declaration of Activity**

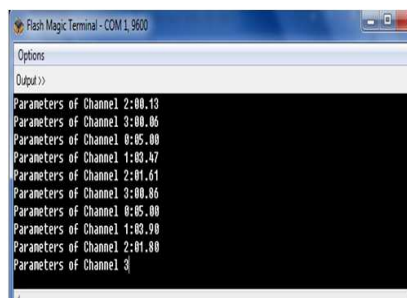
Android manifest.xml is a file that every application needs and it locates in the root directory of application. The intent filter of this xml file describes how and when to start an activity. Any activity defined by user must be declared in this file by user <Activity></Activity> label or the application wouldn't be able to start this activity normally.

- **Sensor Activity Design**

For Android, an interface is corresponding to an activity and all of the transaction logic operations on interface are implemented by activity class. In this system, the activity corresponding to interface of displaying sensor data is sensor activity.

## RESULTS

Result above shows how data serially comes to com port. It is then accessed by java code and converted into web services and there after monitored using android.



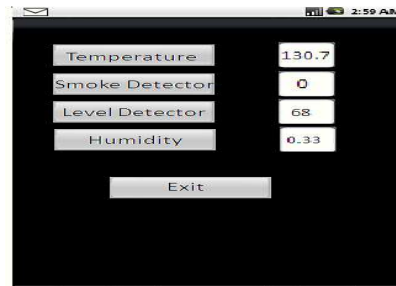
**Figure 4: Result Using Access of Data on Virtual Terminal**

Here channel 0 belongs to Temperature

Channel 1 refer to Smoke Detector

Channel2 refers to Level Detector

Channel 3 refers to Humidity Detector



**Figure 5: Display of Data in Android GUI**

## CONCLUSIONS

In this paper a smart remote monitoring system is explained which does data acquisition from various channels in analog from digitizes it in high 10-bit resolution. Thereafter stores into database server. This paper puts forward an innovative idea of making GUI in android application which can access data stored in dedicated web server anywhere from the word just by touch of once. A build application is user friendly and more importantly a complete monitoring system is portable that one can carry in mobile phone. A proposed system can be expanded for applications such as Healthcare or Industrial plant monitoring system where real time monitoring is required with 3G and for the coming 4G technology it is also possible to monitor the plant LIVE in Video form due to inner eased bandwidth and faster data rates.

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